

FISH SURVEYS
ON THE
UINTA & WASATCH-CACHE NATIONAL FOREST
CONDUCTED DURING 1996

By

Paul K Cowley
Forest Fish Biologist
Uinta and Wasatch-Cache National Forest

January 10, 1997

TABLE OF CONTENTS

TABLE OF CONTENTS	I
LIST OF FIGURES	iii
LIST OF TABLES	v
INTRODUCTION	1
METHODS	1
RESULTS	4
<u>Woodruff Creek Drainage</u>	4
Big Spring Fork	4
Wheeler Creek	6
<u>Logan River</u>	6
Temple Fork/Spawn Creek	9
Little Bear Creek	9
Bunchgrass Creek	9
<u>Blacksmith Fork River</u>	12
Saddle Creek	12
Rock Creek	12
<u>Ogden River</u>	15
Right Fork, South Fork Ogden River	15
Left Fork, South Fork Ogden River	17
Wheat Grass Creek	17
<u>Weber River</u>	21
South Fork Weber River	21
Smith and Morehouse Creek	23
Erickson Creek	23
Red Pine Creek	26
Box Canyon Creek	26
<u>Provo River Drainage</u>	26
Little South Fork Provo River	26
<u>Blacks Fork Basin</u>	29
West Muddy Creek	29
OPPORTUNITIES AND RECOMMENDATIONS	29
<u>Woodruff Creek Drainage</u>	32
Big Spring Fork and Wheeler Creek	32
<u>Logan River</u>	32
<u>Blacksmith Fork River</u>	33
Saddle Creek	33
Rock Creek	33
<u>Ogden River</u>	34
Right Fork, South Fork Ogden River	34
TABLE OF CONTENTS (cont.)	
Left Fork, South Fork Ogden River	34
Wheat Grass Creek	35

<u>Weber River</u>	35
South Fork Weber River	35
Smith and Morehouse and Erickson Creeks	35
Red Pine Creek	35
Box Canyon Creek	35
<u>Provo River Drainage</u>	36
Little South Fork Provo River	36
<u>Blacks Fork Basin</u>	36
West Muddy Creek	36
 GENERAL	 36
 LITERATURE CITED	 37
 APPENDIX	 38

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Length frequency of cutthroat trout captured in Big Spring Fork, Woodruff Creek Drainage, 1996.. . . .	7
2. Length frequency of cutthroat trout captured in Wheeler Creek, Woodruff Creek Drainage, 1996.. . . .	8
3. Length frequency of cutthroat and brown trout captured in Temple and Spawn Creek, Logan River Drainage, 1996..	.10
4. Length frequency of cutthroat trout captured in Little Bear Creek, Logan River Drainage, 1996. . . . .	.11
5. Length frequency of cutthroat trout captured in Bunch-grass Creek, Logan River Drainage, 1996. . . . .	.13
6. Length frequency of trout captured in Saddle Creek, Blacksmith Fork Drainage, 1996.. . . . .	.14
7. Length frequency of trout captured in Rock Creek, Blacksmith Fork Drainage, 1996.. . . . .	.16
8. Length frequency of rainbow trout captured in Right Fork of the South Fork of the Ogden River, Ogden River Drainage, 1996.. . . . .	.18
9. Length frequency of trout captured in Left Fork of the South Fork of the Ogden River, Ogden River Drainage, 1996.. . . . .	.19
10. Length frequency of cutthroat trout captured in Wheat Grass Creek, Ogden River Drainage, 1996. . . . .	.20
11. Length frequency of trout captured in the lower section of the South Fork Weber River, Weber River Drainage, 1996.. . . . .	.22
12. Length frequency of brook and cutthroat trout captured in the upper section of the South Fork Weber River, Weber River Drainage, 1996.. . . . .	.24
13. Length frequency of trout captured in Smith and Morehouse Creek, Weber River Drainage, 1996. . . . .	.25
14. Length frequency of cutthroat, rainbow and brook trout captured in Red Pine Creek, Weber River Drainage, 1996..	.27

LIST OF FIGURES (cont.)

<u>Figure</u>	<u>Page</u>
---------------	-------------

15. Length frequency of cutthroat trout captured in Box Canyon Creek, Weber River Drainage, 1996.28
--	-----

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Sampling location for streams surveyed for fish on the Wasatch-Cache National Forest in 1994 and township (T), range (R) and section (Sec) where sampled.	2
2. Streams surveyed on the Wasatch-Cache National Forest in 1996 and fish species found in sampling sections. . . .	5

INTRODUCTION

During the summer of 1996 the staff of the Uinta & Wasatch-Cache National Forest, Region 4 of the Forest Service, surveyed tributaries throughout the range of the Bonneville cutthroat trout. The main purpose for conducting these surveys was to identify fish species compositions of streams on the forest. A secondary purpose was to take tissue samples from cutthroat trout collected to determine genetic purity. Other information which was hoped could be acquired was a population estimate for fish within the stream and age class distribution of the population. On selected streams in the Logan River Drainage, the main emphasis was to collect and read the tags of previously tagged fish to better understand fish movements in the drainage.

The streams, sampled (Table 1) on the Uinta and Wasatch-Cache National Forest, were selected by Forest staff. Working with a Forest Service seasonal crew and Utah Division of Natural Resources the streams were sampled to determine species composition, fin clips were taken and where possible a population estimate made.

METHODS

Crews sampled at least one location on each stream surveyed. Crews consisted of two to three people. One person ran the electrofishing equipment and, depending on the individual, may also have assist in netting fish. The second person was a netter and a third person was a netter and also carry a bucket to hold captured fish. A string line or a tape measure would be used to determine the ending point of the 100 M section sampled. One sampling location was located near the stream's mouth if on forest or at the forest boundaries if the stream's mouth was off forest. The second sampling location was located near the headwaters. All possible attempts were made to locate sampling sections where a crew, in future years, could relocate and resample the same stream sections.

The sample sections were approximately 100m in length and started and ended at distinguishable habitat breaks. All side channels were sampled within this length of stream section. Fish collected within the sampling section during each pass were placed in a bucket of fresh water until weight, total length and adipose fin clips could be taken. Crews took fin clips from up to 30 cutthroat trout. I selected the adipose fin because I

Table 1. Sampling location for streams surveyed for fish on the Wasatch-Cache National Forest in 1994 and township (T), range (R) and section (Sec) where sampled.

Drainage Creek	BASIN County	Sample Location
BONNEVILLE BASIN		
WOODRUFF CREEK		
BIG SPRINGS	RICH	T8N,R4E,Sec25
WHEELER CREEK	RICH	T8N,R4E,Sec13
LOGAN RIVER		
TEMPLE FORK/SPAWN CREEK	CACHE	T13N,R3E,Sec35
LITTLE BEAR CREEK	CACHE	T13N,R3E,Sec12
BUNCHGRASS CREEK	CACHE	T13N,R3E,Sec2
BLACKSMITH FORK		
SADDLE CREEK	CACHE	T11N,R4E,Sec17
ROCK CREEK	CACHE	T11N,R3E,Sec36
OGDEN RIVER		
RIGHT FORK OGDEN RIVER	WEBER	T6N,R4E,Sec5
LEFT FOR OGDEN RIVER	WEBER	T7N,R4E,Sec31
WHEAT GRASS CREEK	WEBER	T7N,R4E,Sec7
WEBER RIVER		
SOUTH FORK WEBER RIVER (LOWER)	SUMMIT	T1S,R7E,Sec8
SOUTH FORK WEBER RIVER (UPPER)	SUMMIT	T1S,R7E,Sec21
NOBLETT'S CREEK	SUMMIT	T1SN,R7E,Sec8
PULLEM CREEK	SUMMIT	T1S,R7E,Sec16
WHITE PINE CREEK	SUMMIT	T1S,R7E,Sec16
WELCH CREEK	SUMMIT	T1S,R7E,Sec21
MAXWELLS CREEK	SUMMIT	T1S,R7E,Sec28
SMITH AND MOREHOUSE CREEK	SUMMIT	T1S,R7E,Sec8
ERICKSON CREEK	SUMMIT	T1S,R7E,Sec21
RED PINE CREEK	SUMMIT	T1SN,R7E,Sec8
BOX CANYON	SUMMIT	T1S,R7E,Sec16
PROVO RIVER		
LITTLE SOUTH FORK PROVO RIVER	WASATCH	T3S,R7E,Sec32
COLORADO RIVER		
MUDDY CREEK		
WEST MUDDY CREEK	SUMMIT	T3N,R11E,Sec22

S=SOUTH, N=NORTH, E=EAST, W=WEST, F=FORK, C=COUNTY, R=RESERVOIR

believed that removal of this fin would be the least damaging to the fish's ability to survive. Fish less than 80mm were not fin clipped because of the small size of the adipose fin. The

finclips were preserved in 95% alcohol. When available five whole fish were also collected and preserved in 70% alcohol for museum specimens and to make comparisons between meristic counts and DNA analysis. Whole fish were sliced open along the right side to better preserve internal organs.

A population estimate was made for each section were possible. Some populations were not estimated because the sampling assumptions were violated. The assumptions for making population estimates are: (1) equal sampling efforts, (2) the probability of capture for any individual in the population is equal, and (3) the population is closed, no movement, deaths or births occur during or between sampling efforts (White et al. 1982). The probability of capture for any individual is also suppose to be equal between passes. Riley and Fausch (1992) found that this may not always be the case. They suggest that at least three passes be done to test capture probability. In most situations only two passes were conducted because of limited money, time and other resources.

Fish populations were estimated for fish 100mm and over. The probably for capturing fish under 100mm is believed to be too low to make an accurate estimate. With electrofishing the larger the fish, the higher the probability of capture (White et al. 1982). Fish under 50mm were assumed to be age 0 fish. Fish from 51 to 100mm were believed to be age 1 fish. It is realized that in many situations, because of local environmental factors, this generalization may not hold true.

The calculations used to make the population estimate was:

$$N = U1/(1-(U2/U1))$$

where

N = population estimate for the section sampled

U1 = fish captured during the first sample

U2 = fish captured during the second sample

The probability of capture (P) is estimated by using:

$$P=1-(U2/U1).$$

Results from calculation using this formula suggest that if more fish are captured during the second pass than the first pass a violation of the assumptions has occurred and the population estimate is of no value. Also if no fish are captured during a second pass a capture probability of 100 has occurred and all fish in the population have theoretically been captured. An upper and lower bound was placed on the population estimate. The formula used was:

$$CI' N \pm 1.96 \sqrt{N(P(1 \& P))}$$

where:

CI = 95% confidence interval.

In some cases the lower confidence limit was below the number of fish taken from a survey reach. In such cases the lower limit was set as the number of fish, 100mm and longer of a particular species, captured from the stream section.

RESULTS

Twenty-three streams were surveyed on the Uinta and Wasatch-Cache National forests in 1996 (Table 1). All streams except Pullem Creek and the headwaters of Red Pine Creek contained water at the time of sampling. Nobletts Creek and Smith and Morehouse Creek, above the mouth of Erickson Creek, had enough water to support fish but no fish were located during the survey. The other streams were composed of a number of fish species (Table 2).

Woodruff Creek Drainage

Woodruff Creek Drainage is located southwest of the town of Woodruff, Rich County, Utah. Only the headwaters tributaries of Woodruff Creek are found on the Wasatch-Cache National Forest. These tributaries include Big Spring Fork, Wheeler and Sugar Pine creeks. Sugar Pine Creek, a stream containing Bonneville cutthroat trout, was surveyed earlier (Martin and Shiozawa 1983).

Big Spring Fork

Big Spring Fork Creek is a tributary to Woodruff Creek in the Bear River Drainage. The survey section started at the Forest Boundary and went upstream 101.9M. Water temperature at the time of electrofishing the section was 10°C (50°F) at about 10:00 in the morning of 30 July 1996. This section is located at the most upstream end of where fish are located. The stream was Table 2. Streams surveyed on the Wasatch-Cache National Forest in 1996 and fish species found in sampling sections.

Drainage		
Stream		Fish Species
	BONNEVILLE BASIN	
WOODRUFF CREEK		
BIG SPRINGS		CUT
WHEELER CREEK		CUT, SCU
LOGAN RIVER		
TEMPLE FORK/SPAWN CREEK		CUT, BRT
LITTLE BEAR CREEK		CUT

dry about 1/4 mile upstream of this section. The section consisted of 100% cutthroat trout. A total of 14 cutthroat trout were captured during the first pass and three cutthroat trout were captured during a second pass. Only two of these fish collected in the survey section were larger than 100mm. Twenty six additional cutthroat were captured above the sampling site to obtain additional fin clips. The total length of the cutthroat trout captured ranged from 70 to 205mm and averaged 104mm (4.1in.). They weighed from 4g to 110g and averaged 39.5g (1.4oz.). This section of Big Spring Fork consists primarily of age 1 and 2 cutthroat trout as distinguished by length (Figure 1). The population estimate for this section, for fish 100mm in length and over, is 2 fish.

Wheeler Creek

Wheeler Creek is a tributary to Woodruff Creek in the Bear River Drainage. The survey section started at the Forest Boundary and went upstream. No length was measured because the area was a maze of channels. The total time it took to collect 30 fish was 765 seconds. Water temperature at the time of electrofishing the section was 18°C (64°F) at about 1:00 in the afternoon of 30 July 1996. This section is located at the most upstream end of where fish are located. Flows dry up about 1/2 mile upstream of this section. The section consisted of sculpin and cutthroat trout. A total of 30 cutthroat trout were captured during the survey. They ranged in total length from 87 to 332mm and averaged 155.2mm (6.1in.). The weight ranged from 6g to 388g and averaged 51.0g (1.8oz.). This section of Wheeler Creek consists primarily of age 1 and 2 cutthroat trout as distinguished by length (Figure 2).

Logan River

Over the past four years a tagging study has been conducted on the cutthroat trout of the Logan River Drainage. This study is being conducted by the Utah Division of Wildlife Resources. The Forest Service is a cooperator. During 1996 sampling was done in an effort to recapture some of these tagged fish. The majority of the fish were however collected from Spawn Creek. Little Bear Creek was also sampled along with Bunchgrass Creek. Spot sampling was also done on Bear Hollow and Cottonwood creeks, both intermittent stream, with cutthroat trout being found in both streams and brown trout being collected from Cottonwood Creek.

Temple Fork/Spawn Creek

Spawn Creek is a tributary to Temple Fork which is a tributary to the Logan River. Because the intent of the survey was to collect previously tagged fish no set survey sections were established. The area surveyed started at the bottom of the exclosure on Temple Fork and went upstream to the mouth of Spawn Creek. The survey then continued up Spawn Creek. The survey was conducted on 12 June 1996. The section consisted of cutthroat and brown trout. A total of 47 cutthroat trout were captured during the survey along with 4 brown. The total length of the cutthroat trout captured ranged from 102 to 362mm and averaged 143.4mm (5.6in., Figure 3). They weighed from 9g to 430g and averaged 149g (5.3oz.). The total length of the brown trout captured ranged from 110 to 253mm and averaged 177mm (7.0in., Figure 3). Their weight ranged from 12g to 252g and averaged 103g (4.6oz.).

Little Bear Creek

Little Bear Creek is a tributary of the Logan River in the Bear River Drainage. The fish were collected from the mouth going upstream for approximately 1 mile. The main objective of this sample was to collect tagged fish. Therefore no survey length was measured or population estimate made. Water temperature at the time of electrofishing the section was 8.9°C (48°F) at about 11:00 in the morning of 12 June 1996. Cutthroat trouts were the only fish collected in this section. Some totals of 49 cutthroat trout were captured during the survey. The cutthroat trout ranged in length from 108 to 439mm and averaged 155.2mm (6.1in.). They weighed from 12g to 439g and averaged 158.6g (5.6oz.). This section of Little Bear Creek, at this sampling, consisted of age 4 and 5 cutthroat trouts as distinguished by length (Figure 4). Tagged fish recaptured during this survey were tagging 272, 971, 975, 978, 987, 993, 1001, 1086 and 1120.

Bunchgrass Creek

Bunchgrass Creek is a tributary of the Logan River in the Bear River Drainage. The fish were collected from the mouth going upstream for approximately 1 mile. The main objective of this sample was to collect tagged fish. Therefore no survey length was measured or population estimate made. Water temperature at the time of electrofishing the section was 12.2°C (54°F) at about 11:00 in the morning of 13 June 1996. Cutthroat trout were the only fish collected in this section. A total of 98 cutthroat trout were captured during the survey. The cutthroat trout ranged in length from 56 to 321mm and averaged 181mm (7.1in.). They weighed from 2g to 393g and averaged 85.3g (3.0oz.). This section of

Bunchgrass Creek, during this sampling, consisted of age 1, 3 and 4 cutthroat trout as distinguished by length (Figure 5). Tagged fish recaptured during this survey were tag 802 and 903.

Blacksmith Fork River

Saddle Creek

Saddle Creek is a tributary to Left Hand Fork of the Blacksmith Fork River. The survey section started at the Danish Dugway crossing (Township 11 N., Range 4E., Section 17) and went upstream 66M. Water temperature at the time of electrofishing the section was 13.9°C (57°F) at about 9:30 in the morning of 31 July 1996. The section consisted of 2% cutthroat trout, 91% brook trout and 6% brown trout. Two cutthroat, 79 brook and 6 brown trout were captured during the first pass and seven brook trout were captured during the second pass. No additional cutthroat trout were captured above the sampling site, although attempted. The total length of the cutthroat trout captured ranged from 136 to 212mm and averaged 174mm (6.9in.). They weighed from 25g to 85g and averaged 55g (1.9oz.). The population estimate for cutthroat trout in this section was 2. The total length of the brook trout captured ranged from 45 to 278mm and averaged 162.8mm (6.4in.). Their weight ranged from 2g to 227g and averaged 62.8g (2.2oz.). The population estimate for brook trout was 87 and ranges from 86 to 92 fish. The brown trout ranged from 60 to 347mm and averaged 233.84mm (9.2in.). They weighed from 3 to 458g and averaged 168.8g (5.9oz.). The population estimate for brown trout in this section was 6. This section of Saddle Creek consists primarily of age 1, 3 and 4 brook trout as distinguished by length (Figure 6).

Rock Creek

Rock Creek, a tributary to Blacksmith Fork River and was sampled on the 31 July 1996. The survey section started at the upstream end of the culvert, where the Forest Road 054 crosses over the stream, and continues upstream 100M. Water temperature at the time of electrofishing the section was 20°C (68°F) at about 1:30 on the afternoon of 31 July 1996. Game fish found in the section consisted of cutthroat and brown trout. Eleven cutthroat trout, three brown trout and one mountain sucker were captured during the first pass and two cutthroat trout, two brown trout and two mountain suckers were captured during a second pass. Sixteen additional cutthroat trout were captured above and below the sampling site to obtain additional fin clips. The total length of the cutthroat trout captured ranged from 142 to 325mm and averaged

208.4mm (8.2in.). They weighed from 27g to 315g and averaged 301.3g (10.6oz.). The cutthroat trout population estimate, for fish 100mm and larger was 13 fish with an upper range of 16 fish. The total length of the brown trout captured ranged from 70 to 381mm and averaged 184mm (7.2in.). They weighed from 3g to 668g and averaged 276.2g (9.7oz.). The population estimate for brown trout, 100mm and longer, was 3 fish. The total length of the mountain suckers captured ranged from 135 to 180mm and averaged 164.3mm (6.5in.). They weighed from 23g to 74g and averaged 106.3g (3.7oz.). This section of Rock Creek consists primarily of age 3 fish as distinguished by length (Figure 7).

A section of upper Rock Creek was also sampled. This section was located just above the Forest Road 066 stream crossing. No fish were collected through this area. No evidence was seen of fish in the area. Visual detection of fish or their spawning was looked for. Backpack shocking was also conducted with no results.

Ogden River

Right Fork, South Fork Ogden River

The Right Fork of the South Fork of the Ogden River is a tributary to Causey Reservoir. Within the lower two miles of the creek there exists two large bedrock falls and a number of log/debris barriers. The survey section started at the mouth of Pole Canyon and goes upstream 55.5M. The section was sampled on August 6, 1996 at about 2:00 in the afternoon. The section consisted of rainbow trout and sculpin. Thirty-two rainbow trout and 2 sculpin were captured during the first pass and twenty rainbow trout were captured during the second pass. No cutthroat trout were captured in the section. The total length of the rainbow trout captured ranged from 100 to 275mm and averaged 184.4mm (7.2in.). They weighed from 12g to 209g and averaged 72.4g (2.5oz.). The population estimate for rainbow trout in this section was 85 and was estimated to range from 77 to 94 fish. This section of Right Fork of the South Fork Ogden River consisted primarily of age 2, 3 and 4 year-old rainbow trout as distinguished by length (Figure 8).

Left Fork, South Fork Ogden River

The Left Fork of the South Fork of the Ogden River is a tributary to Causey Reservoir. Within the lower mile of the creek there exists a number of log/debris barriers. The survey section started at the mouth of Lake Fork and went upstream 101.5M. The

section was sampled on August 7, 1996 at about one in the afternoon. The section consisted of cutthroat and rainbow trout and sculpin. Forty-five cutthroat trout, one rainbow trout and one sculpin were captured during the first pass and sixteen cutthroat trout and one sculpin were captured during the second pass. The total length of the cutthroat trout captured ranged from 95 to 293mm and averaged 19.4mm (7.5in.). They weighed from 8g to 209g and averaged 72.4g (2.5oz.). The population estimate for rainbow trout in this section was 85 and was estimated to range from 77 to 94 fish. This section of Left Fork of the South Fork Ogden River consisted primarily of age 2, 3 and 4 year old cutthroat trout, as distinguished by length (Figure 9).

Wheat Grass Creek

Wheat Grass Creek is a tributary to the South Fork of the Ogden River. The survey section started where the trail crossed the creek approximately four miles upstream from Camp Kiesel. The section was 100m in length. Water temperature at the time of electrofishing the section was 12°C (54°F) at about 2:00 in the afternoon of 8 August 1996. Cutthroat trout were the only fish collected in this section. Thirty-eight cutthroat trout were captured during the first pass and five cutthroat trout were collected during the second pass. The total length of the cutthroat trout captured ranged from 67 to 245mm and averaged 167.8mm (6.6in.). They weighed from 3g to 155g and averaged 62.3g (2.2oz.). The population estimate for cutthroat trout, 100mm and larger in size, was 35 with an upper bound of 38. The cutthroat trout population in this section consisted primarily of age 1 and age 3 fish, based on their length (Figure 10).

Weber River

South Fork Weber River

The South Fork Weber River is a tributary to the Weber River and is located upstream of town of Oakley. Two survey sections were established on the South Fork Weber River.

The lower survey reach was located just upstream of the Forest Service boundary, adjacent the first dispersed camp site, and goes upstream for 107m. Water temperature at the time of electrofishing the section was 7°C (45°F) at about 9:00 in the morning of 9 September 1996. The section consisted of 62% brook, 24% cutthroat and 14% rainbow trout. An additional 24 cutthroat trout were captured above the survey section. Some of these fish appear to be crosses between cutthroat and rainbow trout. Sculpin were also found in the section but not enumerated. The brook

trout ranged in size from 125 to 210mm and averaged 184.8mm (7.2 inches). They weighted 19 to 119g and averaged 73.4g (2.6oz). The population estimate for brook trout, 100mm and over, in the section was 13 fish, with an upper limit of 15 fish. The cutthroat trout ranged in size from 103 to 367mm and averaged 222.0mm (8.7 inches). They weighted 8 to 460g and averaged 146.3g (5.7oz). The population estimate for cutthroat trout, 100mm and over, in the section was 5 with an upper limit of 7 fish. The rainbow trout ranged in size from 240 to 267mm and averaged 255.7mm (10.1 inches). They weighted 144 to 206g and averaged 169g (6oz). The population estimate for rainbow trout, 100mm and over, in the section was 4 fish and ranged from 3 to 6 fish. No age one fish were found in this section (Figure 11).

The upper survey reach, on the South Fork Weber River, was located adjacent to the end of the trail, and went upstream 100M. This is also the location where water went subsurface. Water temperature at the time of electrofishing the section was 7.2°C (45°F) at about 10:00 in the morning of 10 September 1996. The section consisted of 83% brook and 17% cutthroat. The brook trout ranged in length from 105 to 215mm and averaged 164.1mm (6.5 in.). They weighted 11 to 120g and averaged 52.7g (1.9oz). The population estimate for brook trout, 100mm and over, in the section was 30 and ranged from 29 to 34 fish. The cutthroat trout ranged in size from 123 to 200mm and averaged 163.5mm (6.4 inches). They weighted 18 to 87g and averaged 47.5g (1.7oz). The population estimate for cutthroat trout, 100mm and over, in the section was 6 with an upper limit of 8 fish. Brook trout ranged in age from age one to age three. No young of the year cutthroat trout were found in the section (Figure 12).

Tributaries of the South Fork which were looked at included Nobletts, Pullem, White Pine, Welch and Maxwells creeks. Nobletts, White Pine, Welch and Maxwells creeks all contained water but were fishless. Nobletts Creek was the only stream which appeared to have sufficient habitat to support fish. Stream access to the main South Fork for Nobletts Creek had been blocked by irrigation and pond diversions. Pullem Creek was dry in early September 1996.

Smith and Morehouse Creek

Smith and Morehouse Creek was surveyed at the mouth of Erickson Creek and went downstream 109m. Attempts to locate fish upstream of the mouth of Erickson Creek were unsuccessful. Water temperature at the time of electrofishing the section was 12.2°C (54°F) at about 3:00 in the afternoon of 20 August 1996. The section consisted of 64% brook and 36% cutthroat trout. The brook trout ranged in size from 85 to 235mm and averaged 174.6mm (6.9 inches). They weighted 6 to 186g and averaged 72g (2.5oz). The

population estimate for brook trout, 100mm and over, in the section was 22 and ranged from 21 to 25 fish. The cutthroat trout ranged in size from 104 to 130mm and averaged 114.5mm (4.1 inches). They weighted 9 to 28g and averaged 15g (0.5oz). The population estimate for cutthroat trout, 100mm and over, in the section was 14 and ranged from 13 to 18 fish. Cutthroat trout appear to be in trouble in this section with only age 1 fish being found. Brook trout appear to be doing well with a good mix of size and thus age classes (Figure 13).

Erickson Creek

Erickson Creek was surveyed in its headwater. The creek runs through a flat meadow with a number of meanders. At the time of the survey, at about 1 in the afternoon of 20 August 1996, the water temperature was 12.2°C (54°F). Brook trout were the only species capture in this reach. Because of limited time, only the largest and smallest fish were measured. A total of 44 fish were captured during the first pass. No second pass was conducted. The brook trout ranged in size from 42 to 207mm. No weights were taken.

Red Pine Creek

Red Pine Creek is a tributary at Smith and Morehouse Reservoir. The survey reach started at the bridge crossing adjacent to the Ledgefork Guard Station and went upstream 100 meters. Water temperature at the time of electrofishing the section was 14.4°C (58°F) at about 1:00 in the afternoon of 21 August 1996. The section game fish consisted of 7% brook and 93% cutthroat trout. An additional 14 cutthroat trout were captured above and below the survey section along with one rainbow trout. Sculpin were also found in the section but not enumerated. The brook trout was 222mm in length and weighted 111g. The cutthroat trout ranged in size from 92 to 219mm and averaged 142.6mm (5.7 in.). They weighted 6 to 102g and averaged 33.1g (1.2oz). The population estimate for cutthroat trout, 100mm and over, in the section was 13 with an upper limit of 16 fish. The rainbow trout was 167mm in total length and weighted 43g. It is suspected that the rainbow and brook trout came up from Smith and Morehouse Reservoir because of the limited number and size of fish (Figure 14).

Box Canyon Creek

Box Canyon Creek is a tributary to Red Pine Creek. At the time of the survey Red Pine Creek as dry at the road crossing to

Box Canyon Creek. The reach was located in township 1 south, range 7 east and section 4. Photos were taken to help relocate the sample site. The reach was 100m in length. Water temperature at the time of electrofishing the section was 8.9°C (48°F) at about 10:00 in the morning of 21 August 1996. The section consisted of 100% cutthroat trout. The cutthroat trout ranged in size from 86 to 230mm and averaged 155.9mm (6.1in.). They weighted 8 to 102g and averaged 44.2g (1.6oz). The population estimate for cutthroat trout, 100mm and over, in the section was 24 and ranged from 23 to 28 fish. Additional cutthroat trout were captured above the survey reach. The survey section had a good distribution of age classes (Figure 15).

Provo River Drainage

Little South Fork Provo River

The Little South Fork Provo River is a tributary to the Provo River just downstream of the confluence of the South Fork Provo River above the town of Woodland. The survey section's downstream end was at Forest Road 052 crossing and goes upstream 104m. Water temperature at the time of electrofishing the section was 10°C (50°F) at about 9:00 in the morning of 14 August 1996. The section consisted of cutthroat trout and sculpin. The cutthroat trout ranged in size from 75 to 275mm and averaged 176.6mm (7.0 inches). They weighted 3 to 211g and averaged 76.5g (2.7oz). The population estimate for cutthroat trout, 100mm and over, in the section was 25 and ranged from 24 to 28 fish. There was a good distribution of size classes of the cutthroat trout (Figure 16).

Blacks Fork Basin

West Muddy Creek

West Muddy Creek was sampled at the Forest Service Boundary working upstream for 100m. The boundary is located between sections 22 and 23. Water temperature at the time of electrofishing the section was 7°C (45°F) at about 1:00 in the afternoon of 2 October 1996. Cutthroat trout and sculpin were found within the section. An additional 13 cutthroat trout were captured above and the survey section. The cutthroat trout ranged in size from 80 to 287mm and averaged 183.0mm (7.2 inches). They weighted 4 to 196g and averaged 63.4g (2.3oz). The population estimate for cutthroat trout, 100mm and over, in the section was 15 with an upper limit of 18 fish. All age classes of cutthroat

appear to be present in the survey reach (Figure 17).

OPPORTUNITIES AND RECOMMENDATIONS

Opportunities mean many different things to different people. In this report, I have viewed opportunities from a fish management perspective. Ecosystem management principles would suggest that we manage for all resources so as to not lose any one part. In this report I have dealt with mainly fish issues or habitat issues which were obvious at a glance. No habitat survey was conducted to identify specific habitat project which could be implemented to improve fish habitat.

Twenty-three streams were surveyed on the Uinta and Wasatch-Cache National forests in 1996 (Table 1). All streams except Pullem Creek and the headwaters of Red Pine Creek contained water at the time of sampling. Nobletts Creek and Smith and Morehouse Creek, above the mouth of Erickson Creek, had enough water to support fish but no fish were located during the survey. The other streams were composed of a number of fish species (Table 2).

Woodruff Creek Drainage

Big Spring Fork and Wheeler Creek

Big Spring Fork and Wheeler Creek form the headwaters of Woodruff Creek with only cutthroat trout and sculpin being found in the Woodruff Creek Drainage. The opportunity exists to maintain an entire drainage to preserve Bonneville cutthroat trout. It should be remembered that genetic testing has not been conducted on the cutthroat trout from Big Springs Fork or Wheeler creeks. Currently no techniques exists for distinguishing between Yellowstone and Bear river Bonneville cutthroat trout. This upper area of the Woodruff Creek Drainage has some opportunities for a genetic preserve. Most of the following water is on private lands. Only the headwaters are on public lands. Access into the area is very limited. With all three streams linked, the cutthroat trout should have greater opportunities for survival.

Grazing and trailing along Wheeler Creek, on public lands, is a concern. Also, the road crossing the drainage appears to be adding sediment into the stream.

Logan River

Tagged fish continue to be recaptured in the tributaries of the Logan River. The cutthroat trout population of the upper Logan River continues to appear strong. A man-made migration barrier in Little Bear Creek was removed in 1995. In 1995 and 1996, old log weirs in Temple Fork were altered to provide better upstream passage.

Cottonwood and Bear Hollow creeks, both intermittent tributaries of the upper Logan were sampled during spring runoff. Cottonwood Creek contained brown and cutthroat trout. The cutthroat trout appeared to be spawning. Bear Hollow Creek contained cutthroat trout. Maintaining high water quality in these intermittent streams, which produce cutthroat trout, is important.

Blacksmith Fork River

Saddle Creek

The opportunity exists on Saddle Creek to improve water quality by removing a ford and replacing it with a culvert. This effort would also allow for easier recreational passage. Traffic can be stopped here as travel trailers become stuck in the crossing. A road along the Left Hand Fork of the Blacksmith Fork may also be contributing sediment to the stream.

With the mix of native and non-native fish in Saddle Creek, there exists the opportunity to return the stream to one containing native fish only. This opportunity should be tempered with the fact that a number of beaver ponds exist in the stream. All of these would have to be removed prior to any treatment. Complete removal of non-native fish may still not be possible. It should be recognized that the existing fish populations have value. The lack of other native cutthroat trout populations in close proximity may preclude any small population of native fish from reaching historic strength. It is unlikely that all non-native fish will ever be removed from the drainage. These facts should be considered before considering the removal of non-native fish in the Left Hand Fork of the Blacksmith Fork and Saddle Creek.

Rock Creek

The opportunity exists on Rock Creek to improve the stream habitat for fish. Grazing appeared to be impacting the stream banks. The survey reach was off Forest Lands and appeared to be impacted grazing. The brown trout found in Rock Creek should be removed, when possible, to eliminate predation and competition.

The upper section of Rock Creek appeared to be in excellent condition. The opportunity exists to stock cutthroat trout in this upper section. Prior to stocking fish in this upper meadow an amphibian and macro invertebrate survey would need to be conducted to ensure no detrimental effects would occur from stocking cutthroat trout. I would suggest that only cutthroat trout be considered for stocking. These fish would come from the lower section of Rock Creek, if it is determined that they should be stocked.

Ogden River

Right Fork, South Fork Ogden River

The Right Fork of the South Fork of the Ogden River is one of the most rugged streams this surveyor has ever traversed. The opportunity exists to provide remote fishing experience in close proximity to a major metropolitan area. No opportunities exist for putting a trail within the drainage without major disturbance. Encouraging people to fish this area is also a concern with whirling disease being found in Causey Reservoir. People could carry the disease upstream and infect the upper section of the watershed. Efforts should be made to educate recreationalists about the threat of this disease.

Left Fork, South Fork Ogden River

The Left Fork of the South Fork of the Ogden River is one of the most rugged streams this surveyor has ever traversed. The opportunity exists to provide remote fishing experience in close proximity to a major metropolitan area. No opportunities exist for putting a trail within the drainage without major disturbance. Encouraging people to fish this area is also a concern with whirling disease being found in Causey Reservoir. People could carry the disease upstream and infect the upper section of the watershed. Efforts should be made to educate recreationalists about the threat of this disease. Preliminary results from whirling disease tests suggest that the disease has already migrated up to the sampling point.

Wheat Grass Creek

Wheat Grass Creek has a trail all the way up the drainage. The trail has a number of stream crossings which require wading through the stream. Replacing these fords with small foot bridges would be beneficial both to the stream and the hiker.

Weber River

South Fork Weber River

The South Fork Weber River could provide a strong reserve for native cutthroat trout. A natural barrier exists part way up the stream which would preclude none native fish from migrating into the area. The logistics of treating the stream would be demanding.

Smith and Morehouse and Erickson Creeks

Smith and Morehouse and Erickson creeks could benefit from improving the trails along to the stream. The trail dropping down into Erickson Creek from the top is in critical need of repair. Fish could be stocked in the upper end of Smith and Morehouse Creek after appropriate amphibian and macro invertebrate surveys had been completed.

Red Pine Creek

Red Pine Creek could be improved by stabilizing the banks next to the campground near Ledge Fork. Many of these banks lack riparian vegetation and stream access points. Few deep holding areas existed in the survey reach.

Box Canyon Creek

Box Canyon Creek is a tributary to Red Pine Creek. No enhancement opportunities were identified in Box Canyon Creek.

Provo River Drainage

Little South Fork Provo River

The only opportunity identified in the Little South Fork Provo River was to improve the stream crossing. Currently a ford exists.

Blacks Fork Basin

West Muddy Creek

West Muddy Creek provides the opportunity to maintain native cutthroat trout populations. Access into the area is very limited. In general the habitat appears in good condition but results from a detailed habitat survey will provide quantitative results. Appreciation is express to Carl Larson for permitting access into the area across his private lands.

GENERAL

Staff of the Uinta and Wasatch-Cache National forests in conjunction with the U.S. Fish and Wildlife Service, the states of Wyoming, Idaho and Utah have surveyed 126 streams in the historic range of the Bonneville cutthroat trout. Of these, 13 were fishless and 8 were dry. Of the 105 streams containing fish, 27 (or 26%) contained only non-native trout, 36 (or 35%) contain a mix of native and non-native fish, and 42 (40%) contain native fish. For this comparison any cutthroat trout captured was considered to be a native fish. At first glance one may say that native fish are not of concern. However when one considers that non-native fish are present in more than 60% of the streams surveyed they can be recognized as a real threat. Land management activities also threaten cutthroat trout populations. Overgrazing, improper timber harvest, poor roading techniques. Efforts need to be made to better balance society needs and yet maintain these unique fish.

LITERATURE CITED

- Cowley, P.K. 1994. Fish surveys of the Caribou National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- Cowley, P.K. 1995a. Fish surveys of the Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- Cowley, P.K. 1995b. Fish surveys of the Kemmerer Ranger District, Bridger-Teton National National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- Cowley, P.K. 1996. Fish surveys of the Uinta & Wasatch Cache National Forests 1995. Wasatch-Cache National Forest. Salt Lake City, Utah.
- Riley, S.C., and K.D. Fausch. 1992. Underestimation of trout population size by maximum-likelihood removal estimates in small streams. North American Journal of fisheries Management: 12:768-776.
- Shiozawa, D.K. and R. P. Evans. 1994. The genetic status of the cutthroat trout population in Wheeler Creek, Weber Co., Utah. Final Report to U.S. Forest Service, Wasatch/Cache National Forest. Brigham Young University, Provo, UT. June 6.
- White, GC, D.R. Anderson, K.P. Burnham, D.L. Otis. 1982. Capture-Recapture and removal methods for sampling closed populations. Los Alamos National Laboratory, Los Alamos, New Mexico. LA-8787-NERP, UC-11

APPENDIX